One-step error probability (2020)

Deadline: 18 Sep 23:59

Write a *computer program* implementing asynchronous deterministic updates for a Hopfield network. Use Hebb's rule with $w_{ii} = 0$. Generate and store $p = [12, 24, 48, 70, 100, 120]$ random patterns with $N = 120$ bits. Each bit is either +1 or -1 with probability $\frac{1}{2}$.

For each value of p estimate the one-step error probability $P_{\text{error}}^{t=1}$ based on 10^5 independent trials. Here, one trial means that you generate and store a set of p random patterns, feed one of them, and perform one asynchronous update of a single randomly chosen neuron. If in some trials you encounter $\text{sgn}(0)$, simply set $\text{sgn}(0) = 1$.

List below the values of $P_{\text{error}}^{t=1}$ that you obtained in the following form: $[p_1, p_2, \ldots, p_6]$, where p_n is the value of $P_{\text{error}}^{t=1}$ for the n -th value of p from the list above. Give four decimal places for each p_n.

To obtain credits for this task, you must upload the computer code you used to get all results you enter below, in PDF format. Use the upload button at the top of this page. All PDF files you upload here must also be combined into a single PDF file and submitted to URKUND, before the deadline (see instructions in General information).

List your numerically computed $P_{\text{error}}^{t=1}$ for the parameters given above.

[0 attempts]

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Repeat the task, but now apply Hebb's rule without setting the diagonal weights to zero. For each value of p listed above, estimate the one-step error probability $P_{\text{error}}^{t=1}$ based on 10^5 independent trials.

List your numerically computed $P_{\text{error}}^{t=1}$ for the parameters given above.

[0 attempts]

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